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The effect of hydrotherapy on some of the selected parameters related to Kyphosis in Kyphotic girls

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Abstract

The purpose of the present study was to determine the effect of 6-weeks hydrotherapy on some of the selected parameters related to Kyphosis in kyphotic girls. After sampling and diagnosing the kyphotic girls at the Azad University, 10 subjects were selected. All subjects participated in 18 sessions, three times a week and each time half an hour per session. The dependant variables were involved: back muscles power, spine flexibility, chest expansion, shoulder abduction movement extension which they were measured by dynamometer, goniometer, and strip meter before and after exercise. Data was analyzed by descriptive statistic and dependent T-test at the significant level of ($\alpha=0/05$) and following results were concluded: The result showed that there was a significant difference between post-test in comparison with pre-test for the back muscles power ($p\leq0/05$), shoulder abduction movement ($p\leq0/05$) spine flexibility and the chest expansion ($p\leq0/05$). In comparison with pre-test, it has been shown an increase in value of all dependent variables after the hydrotherapy.

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Keywords: kyphosis, Hydrotherapy, Selected parameters.

1. Introduction

The mid (Thoracic) spine naturally has some kyphosis or “C”-shaped curve (Spine Institute, 2009). A kyphotic spine deformity means there is too much forward (more than 40 to 45 degree) curve in the spine resulting in a rounded or hunch/hump back appearance (Saiari, 2007 & Behboodi, 1995). Postural kyphosis—sometimes called “round back”—is the result of poor posture (Greig et al, 2008; Behboodi, 1995). This condition is most common in adolescents and young adults. Slouching when standing or sitting causes the spine to curve forward (Saiari 2007). Adult kyphosis can have varying symptoms and degrees of severity, from minor changes in the shape to your back, to severe deformity, nerve problems, loss of sensation, or loss of bowel and bladder control, also limit the amount of space in the chest, affecting the function of the cardiac and pulmonary leading chest pain and shortness of breath (Sbati 2005). A number of studies have shown that kyphosis is a matter of the pectoral muscles getting too tight, and the back muscles need to be strengthened (Sinaki et al 1996; Goodman et al 2001). However, some simple exercise can help this condition in just a short matter of the time; another way to get rid of postural kyphosis is through “Hydrotherapy” (Sinaki et al 1996 & Ahmadi pour 2000). Hydrotherapy (Water Therapy) is the oldest, safest, and most inexpensive way to treat. Water healing techniques have been traced back through history as early as 2400 B.C. Ancient Egyptians, Roman and Greek Civilization too depended on water for rutin treatment (Bolton and Goodwin, 1974 & Golland, 1961). Hydrotherapy refers to the medicinal use of the water. Water therapy, has a

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number of physiological and psychological benefits (William, 2004). It is, an excellent medium for enhancing strength, stamina and fitness for health, ranks high among the physical education activities that can be most successfully even taught to those who are disabled (Kokaridas, 2004; Short 1990). Recent researches show aquatic therapy to be beneficial in the treatment of every thing from orthopedic injuries to spinal cord damage, chronic pain, cerebral palsy, multiple sclerosis and kyphosis and also many other conditions, making it useful in a variety of settings (Hurley and Turner. 1991; Meyer, 1990). Swimming is recognized as probably the best way of maintaining or improving the motor fitness of physically disabled individuals, and in consequence, of individuals with kyphosis especially in the case of individuals with a high degree of spinal column deviations whose physical range of movement and ability is often limited (Lepore, Gayle, & Stevens 1998). The success of swimming is due in large part to the buoyancy of the water, which provides support to the body, and helps reduce the effect of gravity, thereby utilizing less energy for performing movements. Hence, people suffering from painful joints or muscles, can perform simple exercise more than easily in water than outside. Numerous researches now, are of the opinion that that hydrostatic pressure of water promotes better blood circulation, and has the beneficial effects on the skin and muscles. It calms the internal organs and the endocrine system, and stimulates nerve reflexes on the spinal cord. However, as stated by Silva et al (2008) : patients suffering from Rheumatoid arthritis can heal more safe and effective in an aquatic environment. It helps increase aerobic capacity, overall activity levels, and muscles strength in arthritic patients. Aquatic therapy is believed to be beneficial because it decrease joint compression forces. The perception of pain and eliminate or drastically reduce the body's protective muscular guarding. This results in decreased muscular spasm and pain that can carry over into the patient's daily functional activities (Garrett, 1997). However, recent study has shown hydrotherapy techniques can improve the following list:

- *Increase flexibility and range of motion
- *Decrease joint stress (joint decompression)
- *Improve functional ability
- *Increase strength

Therefore, the purpose of this action research study was to indicate whether hydrotherapy as “Back Crawl Swimming” can effect on back muscles power, spine flexibility, and chest expansion and shoulder abduction movement extension of an individual with kyphosis.

2. Method

2.1. Participation

Study participants consisted of 10 girls with postural kyphosis (age: 19-23 yrs, weight: 51-65kg, height: 159-168cm). All subjects in this investigation participated in a familiarization session. During the familiarization session, subjects were informed as to the experimental procedures, completed a Personal/Medical history form and informed consent was obtained in writing from each subject. They were undergoing a 6-week term hydrotherapy exercise program with three sessions per week. Every session took 30 minutes.

2.1.1. Measurements

All data achieved in two phases, pre-test and post-test, through the following tests:

- Kyphosis is best seen from the side. So, we utilized New York test to assess kyphosis. To perform this test, the subject was asked to stand behind the device at lateral view while the examiner sits on a chair about 3meters far from device for assessing kyphosis.
- To measure back muscles power, the foot and back dynamometer used. This test was performed with the subject standing at the plate of the device on both feet approximately 15 centimetres -with apart. Adjusted the dynamometer to fit it comfortably in her hands. Then holding it so that rotating inside both hands then subject raised the handle up just by using of back muscle. The subject was asked to keep starting position in all phases.
- By Modified Schober Test was computing the flexibility of spinal. In this test the distance between C7 to T12 was measured in normal standing and extension of spinal by standard tape measure to obtain the amount of the difference of these two positions.
- To assess any deficiencies should measure range of motion in the shoulders. To perform this test, the subject was asked: lie on a treatment table, raise the arm 90 degrees to the side and flex the elbow 90 degrees as well. Her fingers should point upward toward the ceiling in the starting position without moving the upper arm, rotate the shoulder backward into external rotation as far as she can. Hold this position while

the examiner measured the amount of external rotation using a goniometry. Then rotated the shoulder forward into internal rotation as far as she can. Hold this position while the examiner measured the amount of the internal rotation. The examiner should push lightly on the front of the shoulder through-out the test to stabilize the shoulder blade and minimize movement; otherwise, inaccurate measurements would be recorded. Computed the total range of motion (the amount of internal rotation plus the amount of external rotation).

- Finally, to compute the chest expansion performance performed the modified schober test. First, for this test, the examiner put the standard tape measurement around the chest; the measurement was then repeated after a deep breath. The difference assessed between these two positions.

2.1.1.1. A session of hydrotherapy program

Generally, an aquatic treatment session for a patient with musculoskeletal dysfunction lasts 30- 60 minutes (William E., 2004).it is composed of the following components:

- Warm-up
- Range Of Motion(ROM) and flexibility
- Strengthening and Stabilization
- Endurance training
- Coordination and Balance
- Cool-down

Also, a variety of commercially manufactured pool toys/devices used, by the researcher to assist with their efforts.

2.1.1.1.1. Statistical Method

The tests were carried out twice, before a 6-week program of corrective exercises in pool and immediately on completion of corrective exercises program. Data were analyzed by descriptive statistic and T-test. Statistical significance level was determined as $p \leq 0.05$.

3. Results

According to the measurements, following results obtained respectively.

*Table1. Pre- and Post-Experiment Measurements, Note: *Significant improvement, $p < 0.05$.*

Statistical Index	Pre-Test Mean	Post-Test Mean	P Value
Back Muscle Power	25.37±10.8	46.07±12.34	0.001*
Spinal Flexibility	0.65±0.47	2.2±0.71	0.001*
Chest Expansion	2.45±1.36	4.5±1.92	0.001*
Shoulder Abduction Movement Expansion	153.17±13.48	179/6±0.58	0.000*

There were significant differences on Back Muscles Power, Spinal Flexibility, Chest Expansion and Shoulder Abduction Movement Extension following hydrotherapy exercise program.

4. Discussion

The propose of this study was to investigate whether hydrotherapy exercise program can improve Kyphosis in kyphotic girls? According previous studies, muscular strengthening and re-education can be accomplished through water therapy (Nolte-Heuritsch, 1979; Thein et al 1998). Foley et al (2003) showed water therapy can improve the strength of Quadriceps muscles. In fact, water therapy, in other words, exercise in water, would be also benefit for patients with mechanical low back pain to increase their health and strength in general (Konlian, 1999). Arioshi(1999); Sbati (2005) found that exercise in water led to decrease pain and improving movement, strength,

and fitness in patients whereas, different activities can lead to Micro trauma due to muscular weakness and tightness.

Wendy Penrod, a physiotherapist, developed a program that could be used for patients suffer from arthritis. According to Wendy, training in water enables the patients to improve upper and lower body strength, utilizing a combination of the water's buoyancy and resistance. The Patients typically achieved more in the aquatic environment than was possible on land. Buoyancy allowed them to exercise without any pain due to decreased weight-bearing. Hence, they performed simple exercise more than easily and prolonger in water than outside (Michael et al; 2000). Various types of aquatic exercise and the results of this study revealed the positive effects of the hydrotherapy on kyphotic (Milenkovic, 2004, Auxter, 1985).

The present result appears hydrotropism has a significant effect on back flexibility, joints and soft tissues of the body. Also, based on Sbati (2005) the range of motion and flexibility could obtain in initial sessions of the water therapy more than medium to final sessions.

The studies indicate water temperature and water depth also need to be considered. Arioshi et al (1991), reported underwater exercise at 29 – 30 Centigrade is sufficient to achieve gains in flexibility and buoyancy. This position causes relaxation and a reduction in heart rate at rest (Konlian, 1999). A physiological adaptation to regular cardiovascular exercise is a reduction in heart rate at rest. However, two research projects have observed reduction in resting heart rate after chronic shallow water exercise training (Hoeger et al, 1992; Simpson & Lemon, 1995). Tisher (1995), found the positive effects on chest expansion upon completion of a two-week water exercise in patients with AS.

Barczyk et al (2009) examined the influence of corrective exercises on the length and angle of the thoracic kyphosis in water. They repeated an increase in the muscle strength of the lower part of the erector spine and also in shoulder mobility. In other study (Dundar, 2008), a water-based exercises produced better improvement in disability and quality of life of the patients with chronic low back pain (CLBO) than land-based exercise. In additional, an aquatic training program is an effective form of cardiovascular exercise combining both deep (gravity eliminated) and shallow (buoyancy assisted) water exercises.

Deep and shallow water exercise accommodates high intensity cardiovascular training, while reduction the risk that accompany high impact loading (Len Kravitz, 2009).

Following a research, the overall intention of this study is to present its findings to swimming teachers, and in the light of these findings to encourage them to investigate their own situation and practice as reflective practitioners and to adapt some of the procedures presented, with a view to bringing about improvements in the development of future swimming program. Clearly, physical education today requires diverse to approaches relevant to different conditions.

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